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"THE OIL ALGORITHM"--THE IMPACT OF WORLD OIL ON FUTURE U.S. NATIONAL STRATEGY

by

Patrick A. Burns

Lieutenant Colonel, USAF

A RESEARCH REPORT SUBMITTED TO THE FACULTY

IN

FULFILLMENT OF THE CURRICULUM

REQUIREMENT

Advisor: Colonel Don Drenth

MAXWELL AIR FORCE BASE, ALABAMA

April, 1993

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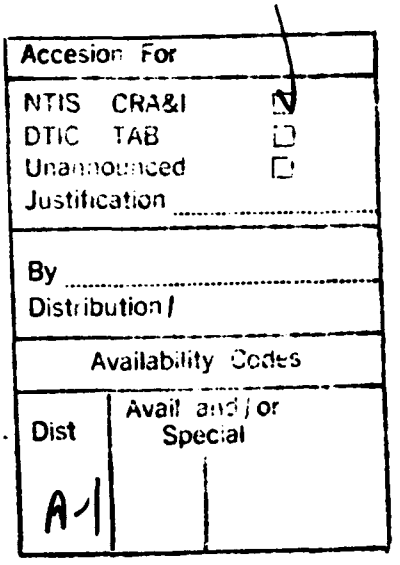

ABSTRACT

TITLE: "The Oil Algorithm"--the Impact of Oil Availability on Future U.S. National Strategy

AUTHOR: Patrick A. Burns, Lieutenant Colonel, USAF

The availability of oil resources plays a key role in U.S. economic, domestic, and military programs. With over 40 percent of U.S. oil requirements currently being supplied by foreign sources, U.S. national strategy must consider domestic, regional, and international strategies that ensure oil security.

This paper reviews world oil production, potential threats, offsetting alternatives, and national security impacts. While many analysts recommend a simple supply and demand solution, the paper recommends a synergistic U.S. national strategy that encapsulates domestic, regional, and international oil policy opportunities.

BIOGRAPHICAL SKETCH

Lieutenant Colonel (Colonel-select) Patrick A. Burns earned a B.S. from the University of Wyoming in Mechanical Engineering, an M.S. from the University of Southern California in Systems Management, and is a Registered Professional Engineer in Virginia. He has been interested in U.S. oil production since working for the U.S. Geological Survey and Union Pacific Natural Resources during college. He served in various positions in Air Force civil engineering at wing-level, major command, and at the Pentagon. He was a distinguished graduate of Officer Training School, Squadron Officer School, and Air Command and Staff College, and will graduate with the Air War College-Class of 1993.

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CHAPTER I

INTRODUCTION

The future of U.S. national security is dependent on critical international issues, such as economic stability, resource availability, and military strength that inter-relate in influencing national strategy.

Oil is a key resource that plays a major role in the economic, domestic, and military programs of all industrialized nations, and thus influences national strategy. The age of cheap, abundant oil supplies dissolved in the 1970s, brought on by rapid industrial growth and oil consumption accompanied by dwindling supplies. In fact, the Arab oil crisis in 1973-74 made the world painfully aware of this increasing energy dependence and its potential as an "economic weapon." (2:147;4:248)

This research paper examines the potential impact of world oil availability on the formulation of future U.S. national strategy. The paper first reviews the current outlook of world oil resources by region. Next, it examines military and non-military threats to sources of U.S. oil resources. Third, it discusses alternative resources and policies to offset U.S. dependence on oil. Fourth, it analyzes resultant impacts on U.S. national security. Finally, the paper concludes with specific recommendations as a result of the above discussions.

CHAPTER II

CURRENT OUTLOOK OF WORLD OIL RESOURCES

The world oil outlook impacts the U.S. based on the complex interrelationship of domestic and international oil supply and demand. The U.S. Geological Survey estimates known world oil reserves will last for another 60 years, if current production and consumption remain constant. (22:2) Stimulated by the 1970s Arab oil crisis, world oil recovery has increased and consumption has decreased since 1978. (8:87;22:1) However, the recent Gulf War again provided oil-dependent countries a reminder that their national interests remain leveraged to oil as a strategic commodity. Analysis of the world oil outlook as a whole is best viewed by examining key regional oil perspectives around the world.

Middle East

In the past few decades, the fortunes of the Middle East have been clearly tied to its vast oil fields--over 60 percent of known world oil reserves are in the Middle East. (26:56-57) Middle East countries produce 27 percent of world oil, yet consume barely 2 percent of world demand. With such a vast differential between production and consumption, Middle East oil exports affect the economy and security of the international environment, inviting interest and involvement of numerous world powers. (10:62) Figure 1 is a snapshot of current Middle East oil production by country.

MIDDLE EAST OIL PRODUCTION

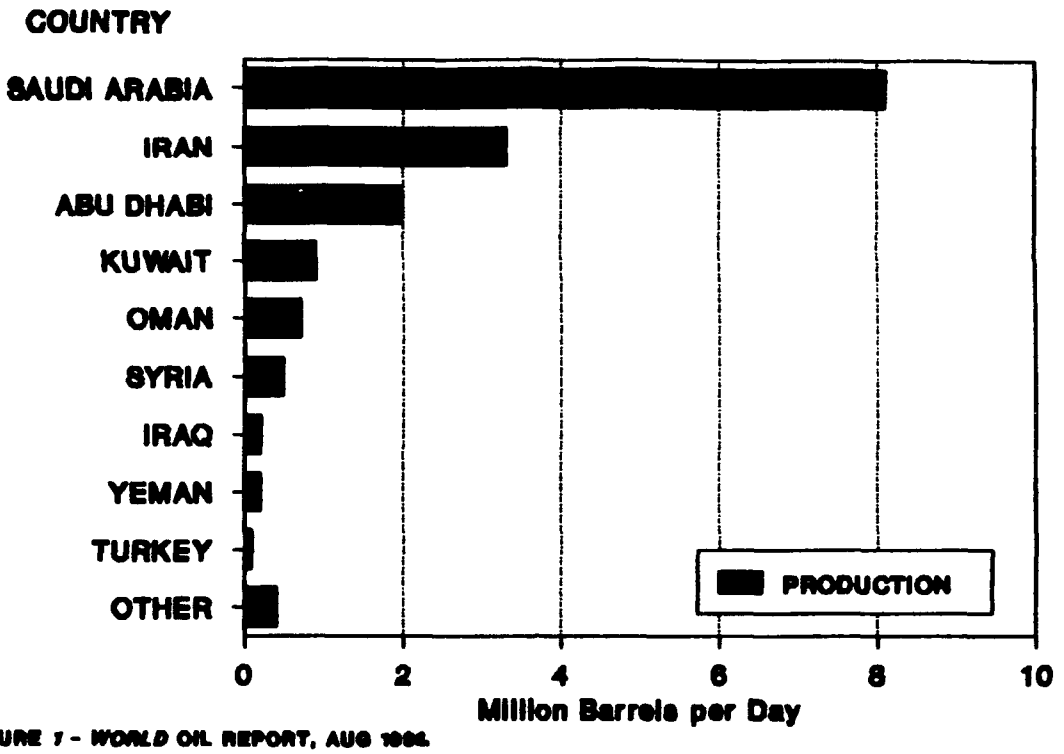

FIGURE 7 - WORLD OIL REPORT, AUG 1990

Saudi Arabia remains the dominant oil producer in the Middle East, producing and exporting more oil than all the other Middle East countries combined. The 1973 and 1979 "oil shocks" revealed Middle East oil pricing or production changes have a dramatic impact on oil dependent countries (including the U.S. and its allies). (30:1,272) More recently. the U.S.-led coalition response to Iraq's invasion of Kuwait and threatened invasion of Saudi Arabia was rooted in the need to ensure continued stable access to the regions's oil supplies. (5:245-256) Thus, the Middle East will continue to be a key national strategy consideration for countries dependent on the regions oil.

Far East

East Asia is currently the most rapidly growing region in the world. The area contains over 30 percent of the world population, 20 percent of the world gross domestic product, and is experiencing 10-12 percent industrial growth. (4:-;2:66-67) These factors lead East Asian nations to account for 14 percent of world oil demand. In contrast, East Asia currently maintains only 4 percent of known world oil reserves and produces 9 percent of daily world oil production. (38:26,66-67) As a result of this regional imbalance between supply and demand, the East Asian region dominates world oil imports in comparison to any other world region. Figure 2, below, identifies the diverse East Asian national oil resource production rates.

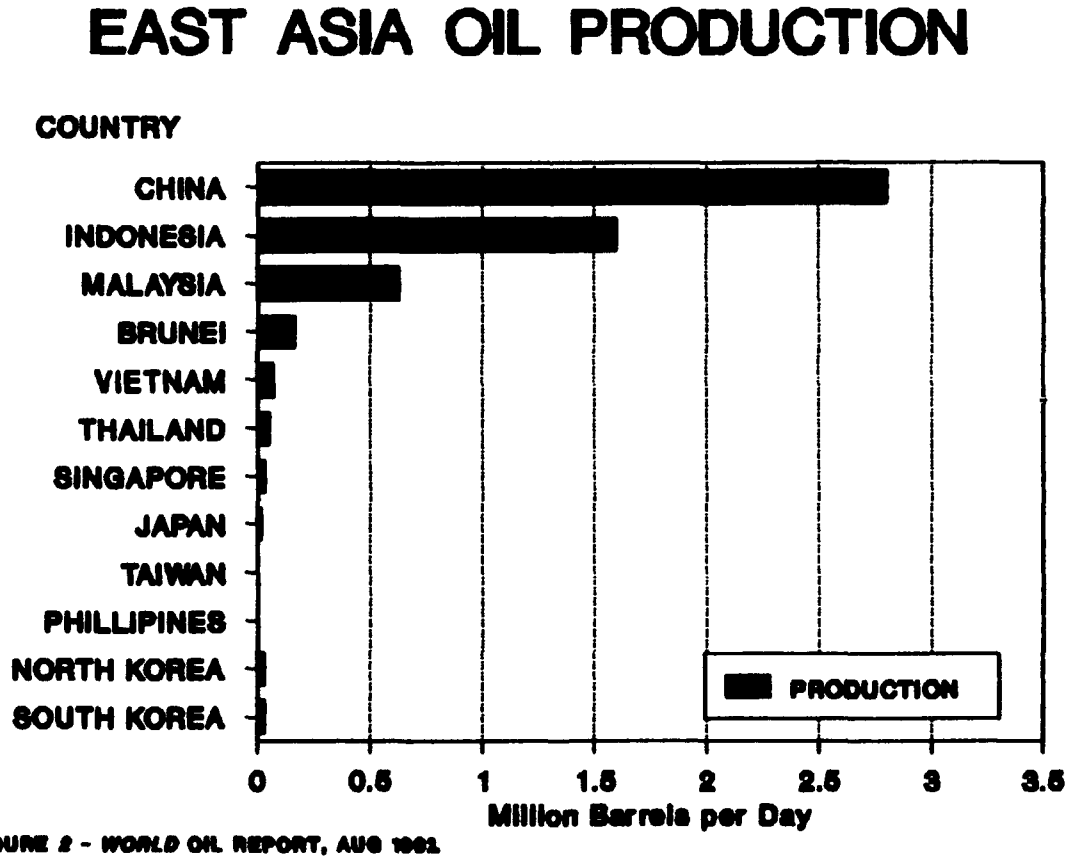

FIGURE 2 - WORLD OIL REPORT, AUG 1991

East Asian countries vary markedly, such that "one must be careful to avoid generalizations about (oil issues in) the region." (38:65) Japan continues in the most leveraged position, importing almost 98 percent of domestic oil consumption demands. China, Indonesia, and Malaysia all produce sufficient oil to meet domestic consumption, although China's rapid annual industrial growth (over 12 percent) threatens that balance. All other nations in the region, except Brunei, consume more oil than they are able to produce, and are thus greatly influenced by oil availability. The decline of Soviet influence in East Asia has opened more opportunity for regional actors to pursue policies that lead to cooperative regional interests, as well as increased U.S. participation in pursuing cooperative arrangements. (4:161-162;25:6) This is certainly true concerning the pursuit of oil resources, as East Asian domestic demand dictates new oil development bolstered by foreign investment and technology.

Western Europe

Of the seven major world oil regions, Western Europe has the lowest oil production, roughly 4.3 million barrels per day amounting to 7 percent of oil production worldwide. With a near-term consumption oil demand exceeding 7 million barrels per day, the region faces continued reliance on oil imports, principally from the Middle East. (27:26) The country-by-country oil resource breakdown is shown in Figure 3.

WESTERN EUROPE OIL PRODUCTION

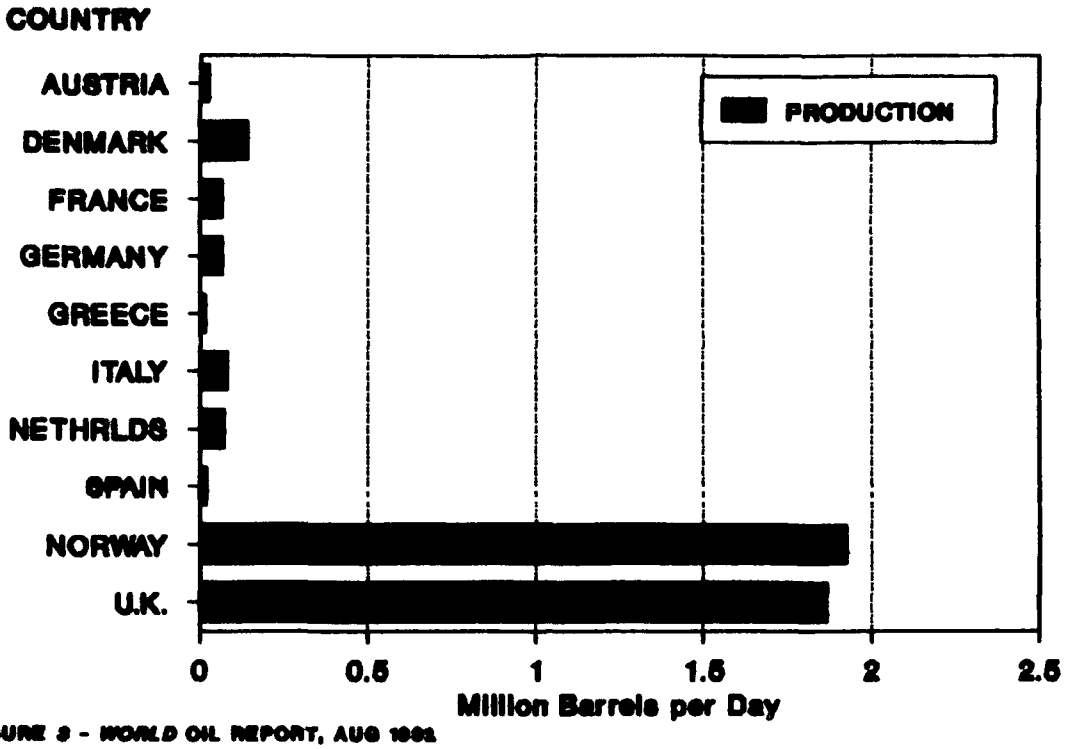

FIGURE 3 - WORLD OIL REPORT, AUG 1991

Obviously, Britain and Norway are in a much different situation than the rest of Western Europe. The advent of the 1973-4 Arab oil crisis prompted the European Community (EC) to pursue cooperative energy policies to mitigate future dependence on Middle East oil. So far, policies focused on more investment in exploration, on increased production by Britain and Norway, and on shifts to alternate fuels have largely been ineffective. (5:170-171) Bilateral dealings by some EC countries (primarily Britain) to solve individual oil shortages have failed to change overall regional EC oil-dependence. Increasing national budget challenges and the reminder of the recent Gulf War continue to pressure Western Europe to seek solutions to EC oil dependence.

Eastern Europe and the C.I.S.

Oil production in Eastern Europe is overwhelmingly dominated by the Commonwealth of Independent States (C.I.S.). The former Soviet Union was the world's largest oil producer at over 10 million barrels per day, accounting for 98 percent of production in Eastern Europe. (55:67) Remaining countries in the region are virtually totally dependent on oil imports. A graphical picture of this disparity is shown in Figure 4.

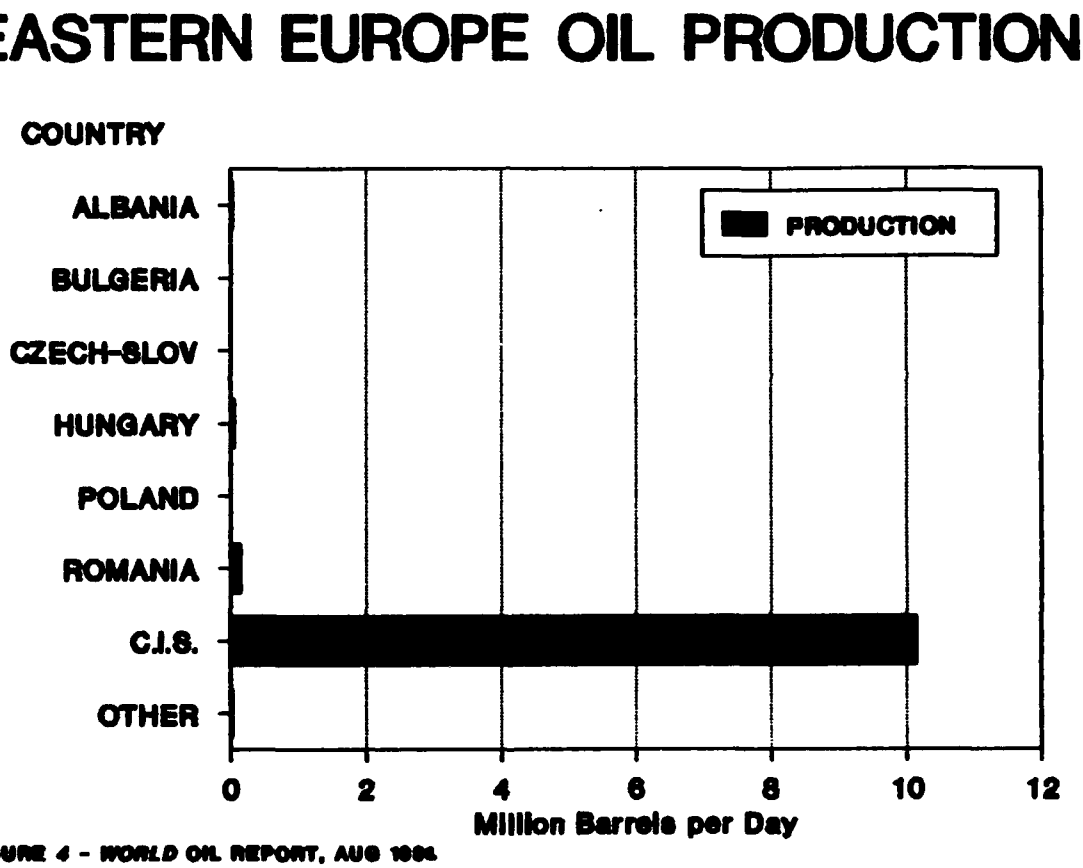

FIGURE 4 - WORLD OIL REPORT, AUG 1994

The future oil outlook for the region appears to be uncertain, due to both political confusion and financial shortfalls. As the former Soviet Union and other countries sort out difficult hurdles associated with transitioning to market economies, the economics of oil production and consumption will have to be reckoned with. (31:13)

South America

South America continues as a stable oil producer, generating just over 4.5 million barrels a day or 7 percent of world production. Venezuela accounts for half of that figure, with the balance evenly distributed as shown in Figure 5. (49:41-52)

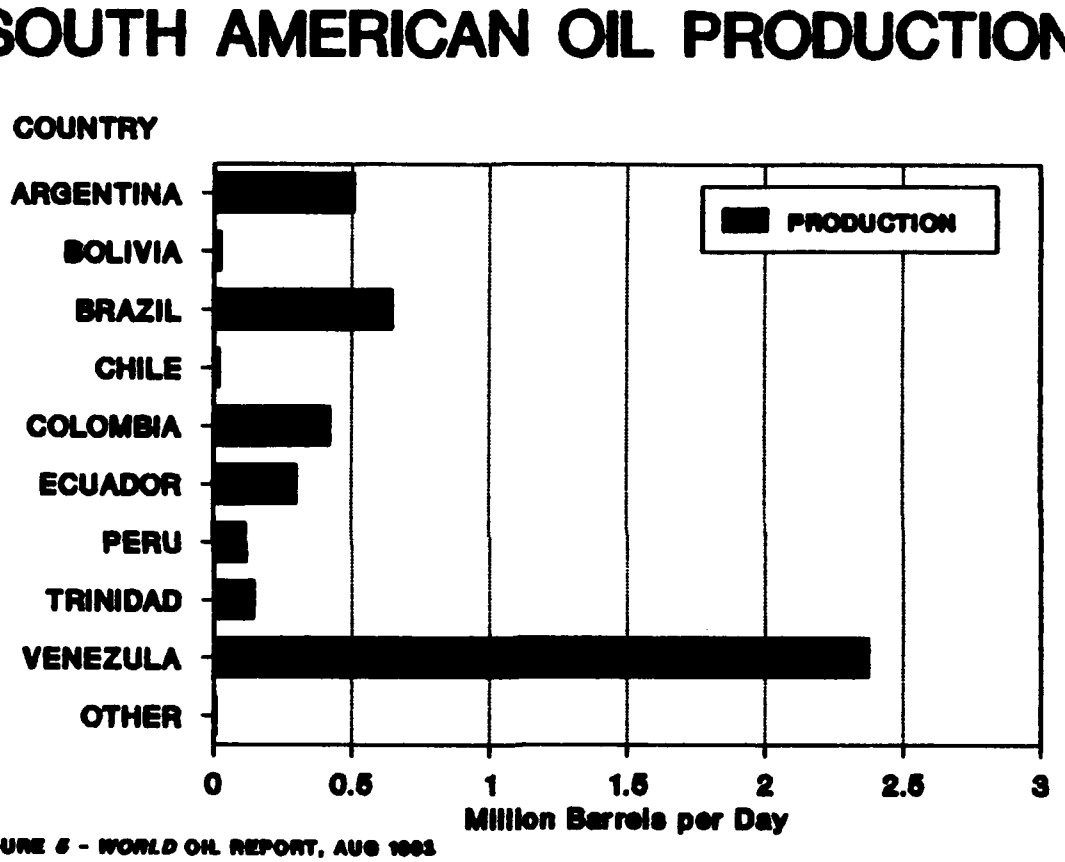

FIGURE 5 - WORLD OIL REPORT, AUG 1993

Experts see South American oil development as a continuing stable bargain, unimpeded by significant environmental, political, or access difficulties. The region hasn't faced the threat of conflict, like the Middle East, nor does it require enormous start-up costs to enter new areas, unlike the C.I.S. (31:13) In short, new discoveries and continued foreign investment bode well for South America's position as a reliable world energy source for the next few decades.

North America

North America is currently the world's second largest oil producing region, accounting for 11.5 million barrels per day. The U.S. accounts for the majority of that total, producing 7.4 million barrels a day--second only to Saudi Arabia. (37:31-39) Figure 6 contains the figures by country.

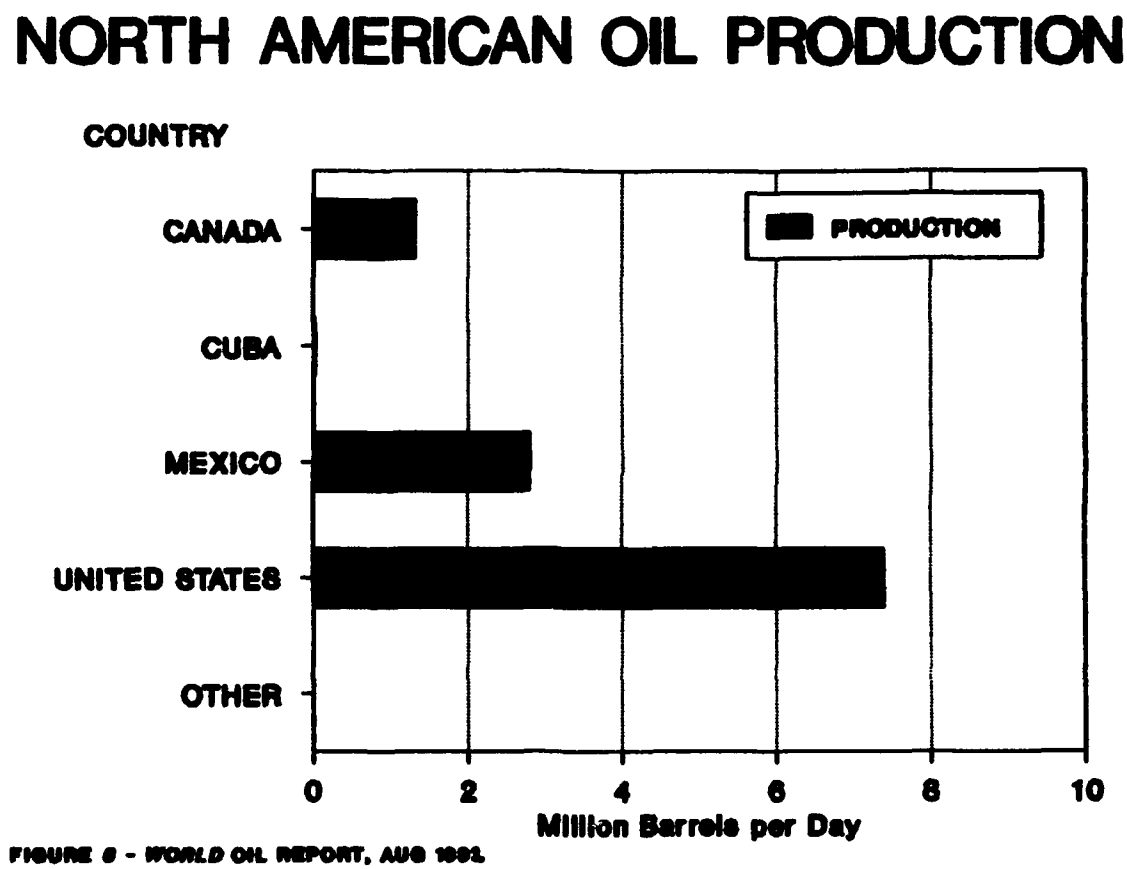

FIGURE 6 - WORLD OIL REPORT, AUG 1991

Although the U.S. appears in a healthy position for basic oil production, two factors breed concern for the future. First, U.S. oil production has decreased in the last few decades, with thousands of mature wells running dry while environmental and regulatory factors limit new exploration. (7:31-37) Second,

both industrial and domestic oil consumption continue to increase, leading to parallel increasing import requirements. The net effect for the near term is that the U.S. must currently import 42% of total oil requirements, exceeding 50 percent by the year 2000 according to most estimates. (5:-;26:-;29:-;37:31-39)

Finally, Figure 7, below, aggregates regional oil production as a share of the world oil market. The Middle East occupies the dominant position with 27 percent of current world production.

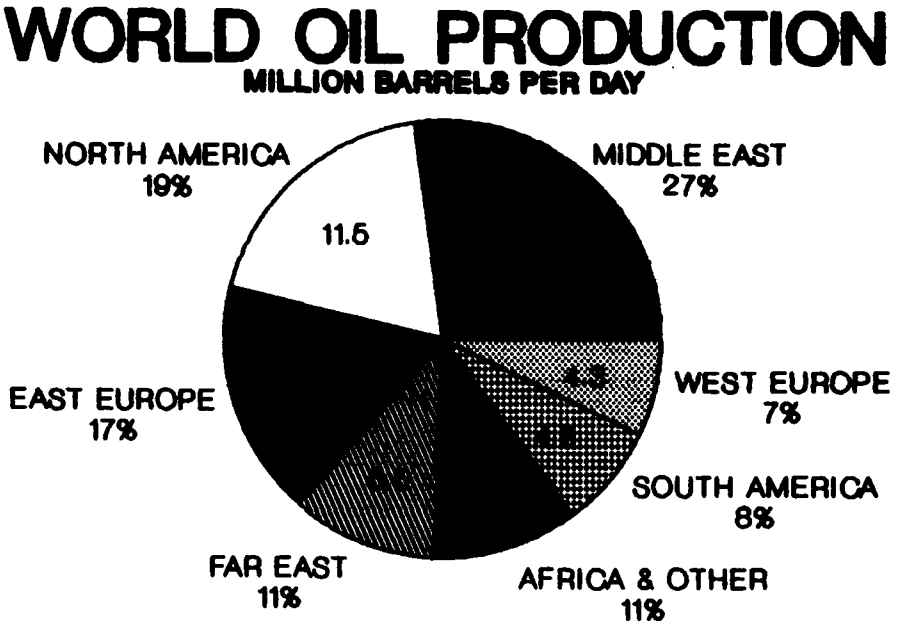

FIGURE 7

Adding all the above factors together, what emerges are seven very diverse regional oil markets, motivated by their strategic oil import or export position. It is important to note that each oil region is also characterized by one or two countries that dominate overall regional export (Saudi Arabia in the Middle East) or import (Japan in the Far East) position. For the U.S., the long term impact of oil dependence and its growing implications at home and abroad bear scrutiny.

CHAPTER III

IMPLICATIONS OF OIL DEPENDENCY FOR THE U.S.

The potential implications of increasing oil dependency for the U.S. in simplistic terms are the consequences of domestic production decreasing while sources of imported oil become threatened. In actual fact, the picture is arguably uncertain, being dependent on complex variables of unknown reserves, political uncertainties, technological alternatives, etc. A reasonable analysis requires a look at potential threats to assured oil availability, impacts on U.S. national security, and potential alternatives.

Threats to Current U.S. Oil Sources

World oil sources have been threatened or reduced from a variety of international factors, such as in the 1973 Arab oil crisis and the 1991 Gulf War. The causes for these and future potential treats to world oil energy security stem from both military and non-military sources.

Military Threats

Military threats to world energy sources are simply "threats posed by sudden and traumatic events such as war, revolution, sabotage." (48:1) The current most publicized (and obvious) international cause of concern is military threats to the oil supplies in the Persian Gulf. (30:1-27;20:ix) Direct outside

aggression, such as Iraq's invasion of Kuwait, or stimulated-insurgency, such as communist action in South Yeman, threatened energy sources vital to the U.S. and its allies. (20:ix-x; 5:255-256) Regional/ internal causes of conflict continue in the forefront in the Persian Gulf. Obviously, further political and/or military instability within Middle East/Persian Gulf oil-producing states could pose renewed threats to world oil supplies. (40:10-24;41:vii) The Institute for Foreign Policy Analysis summarized the problem:

> In addition, we must consider as well the many local sources of conflict in the Persian Gulf-Arabian Peninsula region--quite independent of Soviet moves--which could flare into violence that would disrupt the flow of oil. Prominent among these dangers are pressure for revolutionary change within key producer nations, cleavages between religious and ethnic minorities, divisions within ruling development and new wealth, and age-old regional tensions. It would be risky indeed to assume stable access to adequate (oil) imports given this explosive blend of geopolitics and oil. (41:x)

The vulnerability (and threat) from sabotage or other singular hostile acts to energy supplies serving U.S. and Allied installations is also very real. (34:92) The threat of damage to oil tanks in the Middle East, disruption of oil pipelines in Western Europe or Alaska, or destruction critical oil facilities anywhere in the world pose very real problems. (40:24;41:ix)

Non-Military Threats

Threats to world energy sources are also posed by induced or evolving situations. These non-military threats can stem from "...natural resource depletion, prohibitive financial or technical cost, lack of government leadership, rising internal consumption, political distortion of market forces, and other

developments" (48:1) During the oil shortages in the 1970s,"Arab oil-producing states exercised unprecedented political influence over Western Europe and Japan." (32:102-105,149-1523) Organization of Petroleum Exporting Countries (OPEC) oil production and pricing adjustments in the early 1980s also had visible effects on world energy situations. (48:3)

As a result of these potential threats (both military and non-military) to world oil energy sources, energy security has become an obvious international concern. In fact, for the U.S., energy security is one of the three highest energy priorities in the President's 1991 National Energy Strategy. (56:16,140)

Impact on U.S. National Security

As mentioned previously, the industrial nations of the world share a common concern for oil availability to support economic, domestic, and defense programs. This oil dependence and the experiences of the 1970s energy crisis have led experts to believe that "Energy (and oil) dependence constitutes the most immediate security threat confronting the U.S., Western Europe, and Japan in the 1980s." (41:vii) The impact of oil dependence on U.S. national security can be examined from two perspectives--"direct" industrial and military effects, and "indirect" economic and political consequences, with linkages between both important categories.

Direct Impacts

World oil problems affect international accord and U.S. national security directly based on the military and non-military

threats to current oil sources described above. Disruptions of oil exploration, production, and/or distribution systems adversely impact oil-sensitive national industries and military forces. (6:3)

Curtailment of bulk oil supplies from the Middle East causes the U.S. and the world as a whole the most concern for national security impacts. Because this potential impact on U.S. National Security is so great, the U.S. established Central Command to apply military power to ensure Western access to Persian Gulf oil. (20:x) The U.S. congress, cognizant of political, economic, and military problems associated with oil curtailment, has passed bills for long-term programs and emergency measures to deal with oil supply disruptions or price escalations. (33:22;48:3) More recently, the National Security Strategy of the United States emphasizes the need to ensure "The flow of oil to the economic well-being of the United States and the industrialized world is secured." (35:1)

Indirect Impacts

Indirectly, international oil trade brings economics into the U.S. national security picture, affecting relationships with consumer nations by virtue of their varying levels of import dependence. (6:109;41:2) For example, the period of the 1970s when the Middle East sought to generate higher oil incomes revealed the vulnerability of Western industrialized nations to international energy forces. (6:118) Rising U.S. oil prices increase the cost of industrial operations, adding to inflation,

thus reducing available budget appropriations for defense. (41:3) These economic impacts also affect Third World nations in basic food and raw material production, thus influencing Third World cooperation with the U.S. and allied nations. (6:112-113) The indirect political "oil weapon" was also evident in influencing consumer countries to adopt policies in support of Arab positions on Middle East issues. (41:3)

The above discussion identifies the direct and indirect impacts of energy vulnerability on U.S. national security, thus highlighting the importance of oil energy security alternatives.

Alternative Energy Sources and Polices

All of the world's energy resources have finite limits. In addition to considerations for the security of existing energy sources, the U.S. and other nations are seeking new technologies to utilize alternate resources and pursuing conservation and stockpiling policies to extend already scarce resources.

Alternative Energy Sources

Synfuels. With increasing emphasis on the international balance of fossil fuels (predominantly oil), producing synthetic fuels from hydrocarbon sources is gaining in importance. Surprisingly, potential oil shale, coal and other hydrocarbon deposits in the U.S. alone are far greater than the petroleum reserves of all the Middle East. (50:588) The 1973-74 Oil embargo stimulated initial international interest in synthetic fuels derived from shale and coal. (47:6) However, making oil

from shale or coal currently is not economical, costing "...two to three times as much (as oil production) in recent synfuel demonstration projects." (50:589) Oil shale projects also involve the problem of requiring significant quantities of water for processing (in short supply in the West U.S. where most shale deposits exist). (22:52) Thus, although oil shale and coal are the second most abundant fossil fuel, producing synthetic oil-replacement fuel from these soureces is not economical in today's range of oil prices. (55:70-71)

Solar. Renewed interest in solar-powered energy in various forms was also spurred by the 1970s energy crisis. Solar radiation panels which soak up the sun's rays to heat hot water provide energy contribution in appropriate climates. (18:238) However, the direct conversion of sunlight into electrical energy is still too expensive as a fossil fuel replacement, costing about $10 a watt. In addition, the expense and space for bulky storage batteries for nighttime power add to the difficulties of solar power use. (16:4)

Geothermal. Geothermal energy systems tap the earth's inner heat utilizing hydrothermal, hot dry rock, volcanic, or geopressure sources. (55:95) Use of geothermal energy is thus limited to volcanic hot-spot source areas. (16:6) Producing hydrothermal energy from natural steam and hot water is currently a know technology. However, the promising exploration and recovery alternatives are handcuffed by high development and production costs that will not be cost-effective in the near term. (55:96)

Wind. Interest in wind power was stimulated in the 1960s by growing concern for the quality of the environment, and spurred again in the 1970s by the oil crisis. (16:5) Wind energy conversion is becoming more reliable and efficient thanks to new technology in both materials and aerodynamics. In fact, "WInd power is the solar energy technology closest to being economically competitive in the bulk power market." (55:100) Wind power's limitations are that it is only feasible where adequate winds are available, requires a large number of turbines for any appreciable output, and (similar to solar) requires back-up storage when winds are dormant. (16:5;55:101)

Conservation Policies

Conservation of potentially scarce energy resources and legislative strategic energy initiatives also became important considerations after the 1970s energy crisis. (18:237). Energy conservation on both national and residential scales had a successful impact on extending use of existing energy resources. U.S. oil consumption (helped primarily by conservation) dropped in the late 1970s/early 1980s. As a result of U.S. households lowering thermostats and adjusting other energy-use habits, "Americans cut their home energy use by 17 percent from 1978 through 1980". (36:16-17) Legislated implementation of auto efficiency and building energy efficiency standards also accounted for substantial reductions in consumption. Unfortunately, energy conservation lost interest in the latter 1980s and 1990s, with energy consumption rising as Americans enjoy stable energy supplies at reasonable prices. (9:10;55:1)

Auto efficiency standards have maintained some visibility, thanks to parallel environmental concerns on auto emissions. Congress has held a moderate course on auto efficiency mile-per-gallon standards and imposed a gas guzzler tax in 1991. Some individual states, such as Illinois, have implemented gasoline taxes up to 25 cents-a-gallon to promote conservation (and raise revenues). (54:9) The U.S. also initiated bulk oil storage programs to reduce dependence on foreign sources during crisis periods. The U.S. Strategic Petroleum Reserve program has a long-term goal of "storing 750 million barrels of crude oil in underground caverns along the Gulf Coast." (21:1) Reduced federal emphasis on the program (again as a result of reduced national energy concerns as a whole) leaves current reserves at about "500 million barrels of oil--equal to 90 days of imports." (47:6)

In summary, alternate energy sources show promise, but will not play larger roles to reduce U.S. oil dependence until technology improves and energy prices/supplies change to make alternate sources competitive in the world energy market. Conservation and stockpiling have not yet reached their beneficial potential, and may only be "band-aid" fixes if sufficient technological alternatives to oil are not successful. Therein lies the challenge for the U.S. national strategy for the the next decade.

CHAPTER IV

RESULTANT NATIONAL STRATEGY RECOMMENDATIONS

Most oil analysts characterize solving U.S. oil dependence as a basic formula of supply and demand economics--i.e. the U.S. needs to achieve a sufficient balance of production and secure imports to meet long-term consumption. Those proponents focus on solving environmental, regulatory, and technological barriers to increase domestic production, while building arrangements to further secure Middle East oil. In fact, the President's 1991 National Energy Strategy was criticized as fatally flawed for taking that very approach. (56:45,48,53,275) What the above supply/demand view lacks is a full appreciation for oil as a strategic commodity in U.S. national strategy for every region of the world, as well as interlinking domestic and international factors. This latter viewpoint--what I term the "U.S. oil algorithm"--is necessary to properly encapsulate the strengths and weaknesses of each world oil region in a synergistic U.S. strategy.

Fundamentally, an "algorithm" is a thorough step by step strategy to solve a problem with common factors. For the U.S. to solve oil dependency, the "U.S. oil algorithm" must include a domestic strategy that optimizes oil resources and regulates oil consumption, a regional strategy that takes into account dominant oil actors in each region, and an international strategy that recognizes oil as a strategic international influence.

The Domestic Strategy

U.S. domestic oil strategy should take advantage of four factors. First, autos and heavy transportation account for 63 percent of U.S. oil consumption. Remarkably, a basic 7 mile-per-gallon increase in auto fuel efficiency would decrease U.S. oil import requirements by 2 million barrels per day. (54:167) A Congressionally-legislated increase to 45 miles-per-gallon would save over 5 billion barrels of oil in 10 years time. (56:276) Therefore, U.S. domestic oil strategy must start with increased emphasis on auto fuel efficiency, with a technologically achievable efficiency improvement each year for the next 10 years. Second, some oil conservation initiatives offer distinct and responsive advantages, not only for energy security, but for U.S. debt reduction as well. A simple penny-per-gallon gas tax raises $1 billion per year in U.S. tax revenues, while influencing lower consumption. (29:14) A similar tax increase on fossil fuel-based heating supplies is already being proposed in Congress. Thus U.S. energy conservation strategy should be fiscally based on policies that influence conservation and achieve revenue on consumption. Third, while a few states have experimented with allowing wilderness oil exploration with restoration caveats, most join with the federal government in environmentally banning potential endeavors. Considerable deep oil reserves are known to exist in a belt extending from Texas through the Rocky Mountains to Canada and Alaska. Appropriately, the President's 1991 National Energy Strategy recognizes part of this potential. It proposes opening the Arctic National Wildlife

Refuge and certain Outer Continental Shelf areas for oil exploration/production. (56:112) U.S. domestic energy exploration strategy should expand further to allow deep exploration in western wilderness areas, but require restoration guidelines that meet basic environmental concerns. And fourth, a return to domestic economic imperatives may allow opportune investment in alternative energy sources. Continued research in synfuel, solar, and geothermal alternatives is needed, but is recognizably a long way off from achieving results. (56:126) Opportunities for additional hydroelectric sites and improvements in nuclear plants need to be explored to preclude a potential increasing reliance on oil for electrical generation. (29:15) In particular, federal regulations governing environmental review and construction development of hydropower need to be streamlined to stimulate growth. (55:145) This four-fold domestic approach is needed to increase the ratio of domestic oil production to consumption, leaving the U.S. in an improved leverage position for regional and international oil import strategy.

Reduced oil consumption alone is not the primary solution to U.S. oil needs. "Even with zero passenger car gasoline consumption and no growth in other oil requirements, the U.S. would still have to import 25 percent of its remaining oil needs." (5:178) Thus the need for continuing oil imports must be considered in U.S. oil security strategy.

The Regional Strategy

U.S. regional strategy for oil security should be based on two considerations--the proportion of U.S. oil imports from each

world region and the dominating oil factors that influence key regions. Average U.S. oil imports during the last 5 years have been relatively stable between world regions. Figure 8 below graphs the volumes and percentages.

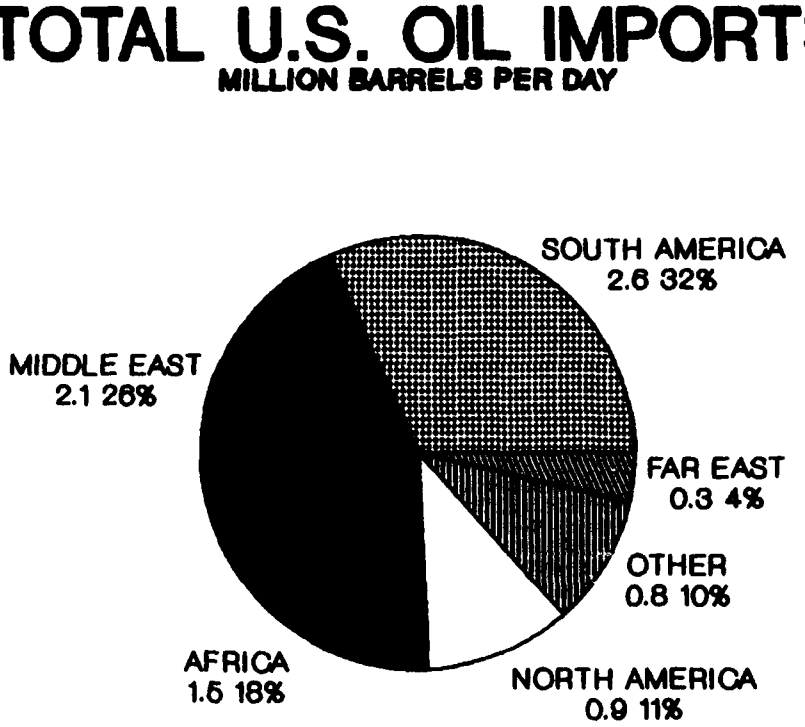

FIGURE 8

The above picture of U.S. oil imports by region is largely a factor of past opportunities for development and exploration. Prior to the 1980s, the Middle East provided the largest share of U.S. imports based on large discoveries of oil deposits and Arab imperatives for foreign cash. The 1970s Arab Oil Crisis caused a reawakening of oil exploration to reduce dependence on Middle East oil, leading to to increased imports from other world oil regions, particularly South America. As mentioned previously,

the Middle East, particularly Saudi Arabia, will remain a key factor for U.S. oil imports in the near term. U.S. regional security policy for the region is soundly based as long as it is not conducted to the exclusion of the other regions.

The Far East represents a promising regional oil market opportunity. The U.S. should couple Japan's oil-deficient position with China's new desires to open up internal and off-shore oil exploration. Japanese subsidy of U.S. oil exploration technology would serve the interests of all three major powers in the region.

Although the U.S. currently does not import oil from Eastern Europe, political, economic, and industrial factors are in place to potentially do so. Russia is known to have considerable undeveloped oil reserves, including some in far eastern Russia and Siberia. Cooperative U.S./Russian arrangements to develop oil reserves in this latter area could be connected to the existing Alaska pipeline, thereby providing a new, large oil import source while extending the life of domestic Alaskan reserves.

U.S. oil strategy for North America is clearly tied to policies with Canada and Mexico. In both cases, U.S. policy is also complicated by the web of other economic, industrial, and trade negotiations fundamental to the shared borders with the two countries. The U.S. must continue to seek new exploration opportunities with the two countries within consistent guidelines for environmental considerations and economic concessions.

Finally, South America continues to represent a relatively stable oil market unimpeded by significant threats to oil exploration or production. However, the U.S. should not over rely on the region's resources and end up in a leveraged position for imports susceptible to a "Latin American oil weapon."

The net desired effect of the above polices should be to balance U.S. oil import dependence so that no one world region dominates more that 20 percent of U.S. oil imports. An example situation is shown below in Figure 9.

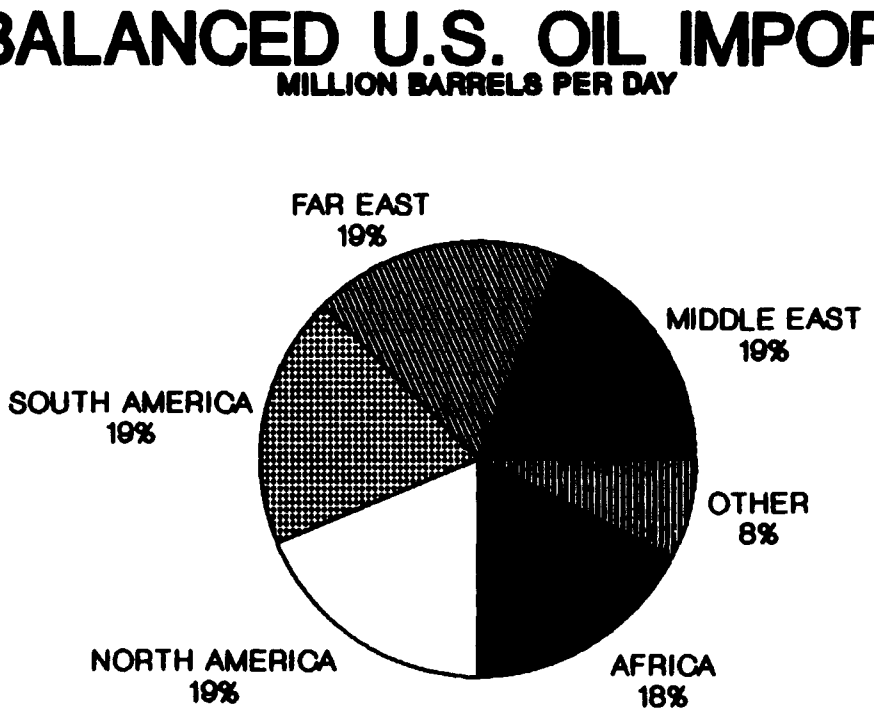

FIGURE 9

As with conservation initiatives, U.S. oil import regional strategy is not a stand-alone solution, as other major powers are obviously competing world-wide for oil resources.

The International Strategy

Internationally, U.S. strategy should be a complex approach of linking two or more regions to couple U.S. oil goals with the strategic positions of multiple regional allies and competitors. The way this can be achieved is through multi-regional agreements that support regional and U.S. interests. For example, partially as a result of the Gulf war, Saudi Arabia and other Arab countries have had to resort to international borrowing to sustain domestic and defense programs. U.S. strategy should be to foster investment in Saudi Arabia by oil-poor Central Europe and Japan, while holding Saudi Arabia to production and price guarantees tied to U.S. defense support programs. Another example is the political confusion and economic shortages that leave Eastern Europe in an uncertain position. The almost total oil import dependence by all but the former Soviet Union leaves Eastern European nations susceptible to considerable influence. U.S. policy should be to stimulate EC cooperation and involvement in meeting East European oil requirements, thus reducing competition in other regional oil markets. Finally, the U.S. should pressure for oil pricing and supply arrangements to be a permanent committee in the United Nations.

The bottom-line of the above recommendations is straight-forward. A balanced U.S. energy strategy must recognize domestic, regional, and international oil energy advantages. No one alternative provides the significant solution. Instead, improved domestic conservation and technology efforts, targeted regional strategies, and international cooperative efforts form the "algorithm" for the U.S.'s oil security future.

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